

**U.S. FISH AND WILDLIFE SERVICE
SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM**

SCIENTIFIC NAME: Oceanodroma castro

COMMON NAME: Band-rumped storm-petrel (Hawaii Distinct Population Segment)

LEAD REGION: Region 1

INFORMATION CURRENT AS OF: 10/11/2005

STATUS/ACTION

☐ Species assessment - determined we do not have sufficient information on file to support a proposal to list the species and, therefore, it was not elevated to Candidate status

☐ New candidate

☒ Continuing candidate

☐ Non-petitioned

☒ Petitioned - Date petition received: 05/08/1989 and 05/11/2004

☒ 90-day positive - FR date: 09/21/1989

☒ 12-month warranted but precluded - FR date: 05/11/2005

☐ Did the petition request a reclassification of a listed species?

FOR PETITIONED CANDIDATE SPECIES:

a. Is listing warranted (if yes, see summary of threats below)? Yes

b. To date, has publication of a proposal to list been precluded by other higher priority listing actions? Yes

c. If the answer to a. and b. is "yes", provide an explanation of why the action is precluded.

We find that the immediate issuance of a proposed rule and timely promulgation of a final rule for this species has been, for the preceding 12 months, and continues to be, precluded by higher priority listing actions (including candidate species with lower LPNs). During the past 12 months, most of our national listing budget has been consumed by work on various listing actions to comply with court orders and court-approved settlement agreements, meeting statutory deadlines for petition findings or listing determinations, emergency listing evaluations and determinations, and essential litigation-related, administrative, and program management tasks. We will continue to monitor the status of this species as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures. For information on listing actions taken over the 12 months, see the discussion of "Progress on Revising the Lists," in the current CNOR which can be viewed on our Internet website (<http://endangered.fws.gov/>).

☐ Listing priority change

Former LP: ☐

New LP: ____

Date when the species first became a Candidate (as currently defined): 09/21/1989

____ Candidate removal: Former LPN: ____

____ A – Taxon is more abundant or widespread than previously believed or not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status.

____ U – Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species.

____ F – Range is no longer a U.S. territory.

____ I – Insufficient information exists on biological vulnerability and threats to support listing.

____ M – Taxon mistakenly included in past notice of review.

____ N – Taxon does not meet the Act's definition of "species."

____ X – Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY: Birds, Family Hydrobatidae (Storm-petrels)

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: Hawaii

CURRENT STATES/COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE: Hawaii

LAND OWNERSHIP: Federal, State of Hawaii, and private land.

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BIOLOGICAL INFORMATION

Species Description

The band-rumped storm-petrel (*Oceanodroma castro*) is a small seabird about 20 centimeters (8 inches) long. It is an overall blackish-brown bird with a white rump. Sexes are alike in size and appearance. The species is long-lived (15-20 years) and probably does not breed until its third year (Ainley 1984 *in* Harrison *et al.* 1990). Field identification can be difficult because several other species of storm-petrels are similar in size, color, and shape; however, vocalizations at breeding colonies are distinctive and can be used to identify the species (Allan 1962).

Taxonomy

Band-rumped storm-petrel specimens were collected by naturalists visiting Hawaii during the 1800s, but were not recognized as *Oceanodroma castro* until the early 1900s (Henshaw 1902). Prior to 1900, the Hawaiian bird had been described as an "unnamed petrel" in the genus *Thalassidroma* (Dole 1869, 1879), as *Cymochorea cryptoleucura* (Ridgeway 1882), and as *O.*

cryptoleucura (Stejneger 1888). After Henshaw's 1902 publication, the bird was commonly known as O. castro cryptoleucura, the Hawaiian storm-petrel (Harrison et al. 1990). Other common names for this species are the Harcourt's or Madeiran storm-petrel. Native Hawaiian names for the bird include oeo, akeake, and lupeakeke (Harrison et al. 1990).

Although the Hawaiian population was previously recognized as a distinct subspecies, taxonomists today generally combine the various Pacific populations into a single taxon. Austin (1952) studied the taxonomy of the band-rumped storm-petrel and concluded that, although the various populations exhibited minor size differences, these differences were not significant and the populations were best considered as belonging to a single subspecies. After examining a series of specimens, Harris (1969) likewise concluded that, although the species showed considerable variation among populations, the differences did not warrant recognition as subspecies. The American Ornithologists' Union (AOU) currently regards the species as monotypic with no recognized subspecies (Burt Monroe, Jr., AOU, in litt., 1989).

Habitat/Life History

When not at nesting sites, adults spend their time foraging on the open ocean. In the Hawaiian Islands, this species nests in remote cliff locations on Kauai and Lehua Islet and in high-elevation lava fields on Hawaii. Only three inactive nests have been found in the Hawaiian Islands, one in a small lava tube at 8,500 feet elevation on the southeastern slope of Mauna Loa volcano on Hawaii (D. Hu, Hawaii Volcanoes National Park, unpubl. data), one on a sheer cliff in remote Pohakuao Valley on the Na Pali coast of Kauai (Wood et al. 2002; K. Wood, Pele Pacifica, pers. obs. 2003), and one in a small cave on Lehua Islet, which is located 1 kilometers (km) (0.6 miles (mi)) north of Niihau (VanderWerf et al. 2003). All nests were located in small caves or crevices, and were confirmed to be nests of this species by skeletal remains found in the nest. No other nests have been found despite intensive searching (Slotterback 2002). In other areas, nests are placed in crevices, holes, and protected ledges along cliff faces, where a single egg is laid (Allan 1962; Harris 1969; Slotterback 2002). Adults visit the nest site after dark, where they can be detected by their distinctive calls. In Hawaii, the nesting season occurs during the summer months, with adults establishing nesting sites in April or May. The incubation period averages 42 days (Harris 1969) and the young reach fledging stage in 64 to 70 days (Allan 1962; Harris 1969). Food is taken from the ocean surface and consists mostly of small fish, squid, crustaceans, oily scraps of marine animal carcasses, and garbage remnants (King 1967; Harris 1969).

Historical Range/Distribution

The band-rumped storm-petrel probably was common on all of the main Hawaiian Islands when aboriginal Polynesians arrived about 1,500 years ago (Berger 1972; Pyle 1984; Harrison et al. 1990). As evidenced by abundant storm-petrel bones found in middens on the island of Hawaii (Harrison et al. 1990), and in excavation sites on Oahu and Molokai (Olson and James 1982), band-rumped storm-petrels once were very numerous and nested in sufficiently accessible sites to be used as a source of food and possibly feathers (Harrison et al. 1990).

Current Range/Distribution

The band-rumped storm-petrel is found in several areas of the subtropical Pacific and Atlantic

Oceans (Harris 1969). In the Pacific, there are three widely separated breeding populations--one in Japan, one in Hawaii, and one in the Galapagos (Richardson 1957; Harris 1969).

In Hawaii, band-rumped storm-petrels currently are known to nest only in remote cliff locations on Kauai and Lehua Islet, and in high-elevation lava fields on Hawaii. Vocalizations of the species were heard in Haleakala Crater on Maui in 1992, but have not been detected there recently. Given the current scarcity of breeding colonies in Hawaii and their remote, inaccessible locations compared to prehistoric population levels, the band-rumped storm-petrel was significantly reduced in numbers and range following settlement of the Hawaiian Islands by aboriginal Polynesians. This likely was the beginning of a decline in the band-rumped storm-petrel population that has continued to the low numbers found today in the Hawaiian Islands.

The Japanese population, which breeds on islets off the east coast of Japan, appears to range mostly east and south of Japan (Harrison 1983), but occurs only within about 1,400 km (860 mi) of the breeding colonies. The absence of records from western Micronesia (Pyle and Engbring 1985) suggests there is a distributional gap between the Japanese and Hawaiian populations. However, the scarcity of observations in this part of the Pacific could also reflect a lack of survey effort.

Atlantic breeding populations are restricted to the eastern portions of the ocean, primarily in the Azores Island group off northwestern Africa (Cramp and Simmons 1977). Wintering birds from this population may occur as far west as the mid-Atlantic, with small numbers reaching the coasts of North and South America (Cramp and Simmons 1977). The Atlantic breeding populations are not within the borders of the United States (U.S.) or under U.S. jurisdiction.

Both the Atlantic and Pacific band-rumped storm-petrels are most commonly found in close proximity to breeding islands (King 1967). The three populations in the Pacific are separated by long distances across the ocean where birds are not found continuously. Pitman (1986) found virtually no records of birds of the Galapagos outside the immediate area of the Galapagos Islands. Extensive at-sea surveys of the Pacific have revealed a broad gap in distribution of the band-rumped storm-petrel to the east and west of the Hawaiian Islands (Pitman 1986; Spear *et al.* 1994), indicating the distribution of birds in the central Pacific around Hawaii is disjunct from other nesting areas.

Population Estimates/Status

Populations in Japan and the Galapagos are comparatively large and number in the thousands (Coulter 1984; Hasegawa 1984), while the Hawaiian birds represent a small, remnant population of possibly only a few hundred pairs (Harrison *et al.* 1984; Harrison *et al.* 1990). The Hawaiian population of the band-rumped storm-petrel is the only population within U.S. borders or under U.S. jurisdiction. Spear *et al.* (1994) estimated that perhaps as many as 5,500 birds occur in the eastern and central tropical Pacific, with a concentration near the Marshall Islands, but the origin of these birds is not clear.

Evidence of extant nesting populations of band-rumped storm-petrels in the Hawaiian Islands is based on auditory detection of adult birds during breeding season surveys and by retrieval of

fledglings in the fall. Band-rumped storm-petrels, as with other storm-petrels, make very distinctive calls during the breeding season as they approach their nesting colonies. These calls can be detected during nocturnal surveys and used to locate and identify nesting colonies. Fledglings have been retrieved on the islands of Hawaii and Kauai, and provide additional evidence of nesting colonies within the Hawaiian archipelago (Harrison et al. 1990). On Hawaii, band-rumped storm-petrels nest in barren lava fields above 2,130 meters (m) (7,000 feet (ft)) elevation; on Kauai and Lehua Islet they nest on rocky cliffs (Wood et al. 2002, VanderWerf et al. 2003). Some nests are believed to occur at elevations of 3,050 m (10,000 ft) or more (Service, unpubl. data).

Band-rumped Storm-petrels are regularly reported in coastal waters around Kauai, Niihau, and Hawaii, including reports of regular concentrations of storm-petrels at various distances offshore from possible nesting colonies (Harrison et al. 1990; Tom Telfer, State of Hawaii, pers. comm. 1997, VanderWerf et al. 2003). These “rafts,” which number from a few birds to perhaps a hundred, may be birds awaiting nightfall before coming ashore to the breeding colonies. A database of bird observations maintained at the Bishop Museum in Honolulu contains 39 reports of the species in Hawaii since 1995, with 30 of them from Kauai (R. Pyle, Bishop Museum, pers. comm. 2005). The largest number reported was 27 birds, on 28 July 1993 from the Kaulakahi channel between Kauai and Niihau. Concentrations of birds found near the equator south of the Hawaiian Islands and in the Marshall Islands (Spear et al. 1994), may be part of the Hawaiian population, but assignment of these birds to an exact breeding location is speculative.

More information is needed to identify locations where management actions could be best implemented, and field surveys are needed to monitor the adequacy of any management actions implemented. Annual surveys could be conducted in known nesting areas by listening for birds as they return at night, by use of marine radar, or by surveys at sea to identify concentrations of birds that may form offshore from nesting areas.

Kauai

Kauai likely has the largest population of band-rumped storm-petrels in the Hawaiian Islands (Harrison et al. 1990). Breeding bird surveys on Kauai in 1992 by the Service (unpubl. data) detected a few band-rumped storm-petrels along the northern shore in Nualolo Valley. Harrison et al. (1990) reported many band-rumped storm-petrels on the southern and southwestern side of Kauai at the mouths of Waimea Canyon and Hanapepe Valley, and suggested that the island of Kauai has the largest population in the islands. Harrison et al. (1990) concluded that band-rumped storm-petrels probably nested along the cliffs of these two valleys and elsewhere on the island. A search of Hanapepe Valley in 1980 by J. Sincock revealed what appeared to be burrows, feathers, and feces on the cliff face 50-70 m (165-230 ft) from the top of the cliff (Harrison et al. 1990). In 1992, almost the same location was occupied by common mynas (*Acridotheres tristis*), and band-rumped storm-petrels were not heard during nocturnal surveys (Service, unpubl. data). Crossin (1974) found band-rumped storm-petrels off the southern coast of Kauai but speculated that the population on the island “cannot be large.”

Surveys in 2002 by Wood et al. (2002) revealed what appear to be nesting populations in six locations, including one in Waimea Canyon east of Waimea Canyon lookout, four populations

along the Na Pali Coast (Kalalau, Pohakuao, Nuololo Aina, and Nuololo Kai), and one at the eastern rim of Nuololo and Awaawapuhi Valleys (accessed from the Awaawapuhi Trail in Kokee State Park). Three other sites were monitored and appear to be areas where the petrels are in transit to near-by nesting areas, including upper Waimea Canyon; Honopu (Kokee State Park); and Kalalau Rim (Kokee State Park). Wood *et al.* (2002) estimated there were 171-221 nesting pairs on Kauai. Auditory surveys by K. Wood and others in 2004 and 2005 detected 43-45 birds at the Pohakuao site, and 81 birds at the Nuololo/Awaawapuhi site (K. Wood, unpubl. data, 2005). At the Pohakuao site, K. Wood later repelled down the cliff face to the area where nests were suspected to be, and recovered the remains of a small seabird from a small cave on the cliff face. The bones were compared with skeletal specimens at Bishop Museum by E. VanderWerf and identified as those of a band-rumped storm-petrel, making this the first confirmed nest site for this species in the Hawaiian Islands. Rat bones also were collected from the same site, indicating that even these sheer cliffs are subject to rat predation.

Lehua Islet

In February 2002, the skull of a juvenile storm-petrel was collected from a small cave on Lehua Islet, which is located 1 km (0.6 mi) north of Niihau and 31 km (19 mi) southwest of Kauai (VanderWerf *et al.* 2003). The skull did not closely match any storm-petrel species in the reference collection at Bishop Museum, but the skull was from a young bird and was not fully developed, perhaps confounding the identification. The specimen was sent to Dr. David Steadman for examination, who determined that it was not Leach's storm-petrel (*O. leucorhoa*), but was not able to conclusively determine the species either. On 6 July 2002, VanderWerf *et al.* (2003) heard band-rumped storm-petrel calls on the outer slope of Lehua Islet on three occasions. On 1 June 2003, six birds were observed circling off the western tip of the islet at dusk, and the calls of a single bird were heard on the tip of the islet (VanderWerf *et al.* 2003). Because band-rumped storm-petrels were subsequently observed on Lehua Islet, it is most likely that the skeletal specimen is of that species.

Hawaii

Band-rumped storm-petrels have been detected in several areas on the slopes of Mauna Loa volcano from 1,830-3,050 m (6,000-10,000 ft) elevation (Banko *et al.* 1991; USFWS, unpubl. data 1992, D. Hu, Hawaii Volcanoes National Park, pers. comm. 2005), but only in small numbers. The remains of two adults were found in April 1994 outside a small lava tube at 8,500 feet elevation on the southeastern flank of Mauna Loa. Both birds had been depredated, probably by a cat, and presumably were attempting to nest in the lava tube. Calls of this species were regularly heard in this area in 2004-2005, and one bird was accidentally caught in a mist-net in August 2003. Storm-petrels have also been heard on the eastern slope of Mauna Loa near the Keauhou Ranch boundary, and on the western slope above Hawaiian Ocean View Estates (D. Hu, unpubl. data 2005). The remains of a dead band-rumped storm-petrel were found under a power line along the road leading to the atmospheric observatory on the northern slope of Mauna Loa on September 3, 2001 (D. Hu, unpubl. data 2005). Surveys of other portions of the island failed to discover any birds, even with the use of marine radar and night-vision optics (Cooper *et al.* 1996, Reynolds *et al.* 1997).

Kahoolawe

Olson (1992) reported the historical presence of band-rumped storm-petrels on Kahoolawe and speculated that the species may still exist there; however, rat populations on this island likely would limit populations to inaccessible locations.

Maui

On Maui, band-rumped storm-petrels were detected during breeding season surveys at Haleakala Crater in 1992 (Service, unpubl. data). This survey confirmed past records of a small number of storm-petrels vocalizing during the breeding season at this location (Pyle 1984; Warren B. King, pers. comm. in Harrison *et al.* 1990). Despite extensive work in the dark-rumped petrel colonies within Haleakala National Park, no band-rumped storm-petrel nest sites have ever been located (C. Natividad-Hodges, Haleakala National Park, pers. comm. 1997).

Recent breeding season surveys on Hawaii, Kauai, and Lehua Islet, as well as reports of fledglings picked up on Hawaii, Maui, and Kauai, confirm that remnant populations still exist on these islands. It is not possible to determine if they are viable, but they certainly are not large and represent only a fraction of pre-historic distribution.

DISTINCT POPULATION SEGMENT (DPS)

The definition of “species” in section 3(15) of the Endangered Species Act (Act) includes any distinct population segment(s) of any species of vertebrate fish or wildlife that interbreed when mature. For a population to be listed under the Act as a distinct vertebrate population segment, three elements are considered--1) the discreteness of the population segment in relation to the remainder of the species to which it belongs, 2) the significance of the population segment to the species to which it belongs, and 3) the population segment’s conservation status in relation to the Act’s standards for listing (i.e., is the population segment, when treated as if it were a species, endangered or threatened?) (61 FR 4722).

The available information indicates that distinct populations of band-rumped storm-petrels are definable and that the distinct population segment of band-rumped storm-petrel in the Hawaiian Islands is discrete in relation to the remainder of the species as a whole. The population segment is distinct based on geographic and distributional isolation from other band-rumped storm-petrel populations in Japan, the Galapagos Islands, and the Atlantic Ocean, which are each at least 6,400 km away. A population also can be considered “discrete” if it is delimited by international boundaries across which exist differences in management control of the species. The Hawaiian Islands population of the band-rumped storm-petrel is the only population within U.S. borders or under U.S. jurisdiction. The Galapagos Islands are considered a national park by the government of Ecuador, so the nesting areas of the species in Ecuador receive some protection, but the species itself is not protected by law. In Japan, birds and mammals are regulated under the Wildlife Protection and Hunting Law, but the Band-rumped Storm-petrel is not considered an endangered species in the Red Data Book of Japan", which was published in 1991.

A population segment is considered “significant” if its loss would constitute a significant gap in the range of the taxon. As discussed above, the Hawaiian Islands population constitutes the Central Pacific distribution of band-rumped storm-petrels between the Galapagos and Japan populations. The loss of this population would cause a significant gap in the distribution of the

band-rumped storm-petrel in the Pacific, and could result in the complete isolation of the Galapagos and Japan populations. Loss of the Hawaii population would decrease the range of the species by approximately one-third, and would increase the distance between populations in the Pacific from 6,400 km to over 12,000 km. Based on the discreteness and significance of the Hawaiian Islands population, the U.S. Fish and Wildlife Service (Service) considers it to be a distinct vertebrate population segment which warrants review for listing under the Act.

Both the Atlantic and Pacific band-rumped storm-petrels are most commonly found in close proximity to breeding islands (King 1967). Pitman (1986) found virtually no records of birds of the Galapagos outside the immediate area of the Galapagos Islands. The Japanese population is over 6,400 kilometers (km) (4,000 miles (mi)) west of Hawaii, and the Galapagos population is a similar distance to the southeast. At-sea surveys of the Pacific have revealed a broad gap in distribution of the band-rumped storm-petrel to the east and west of the Hawaiian Islands (Pitman 1986; Spear *et al.* 1994), indicating the distribution of birds in the central Pacific around Hawaii is disjunct from other nesting areas.

The band-rumped storm-petrel demonstrates high fidelity to nest chambers, suggesting genetic isolation of colonies (Allan 1962; Harris 1969). The actual degree of genetic isolation of the Hawaiian population is not known, and it is not likely that any genetic studies will be completed soon. A limited amount of dispersal, restricted mostly to pre-breeding young, may occur. Harris (1969) states that populations are “probably distinct with little mixing.” Investigation of the genetic relationships of the Hawaiian dark-rumped petrel (*Pterodroma phaeopygia sandwichensis*), a related species with similarly disjunct breeding populations in the Galapagos and Hawaii, has shown no genetic interchange between the two locations (Browne *et al.* 1997). Browne *et al.* (1997) concluded that if one of the Pacific populations is lost, natural recolonization following from the other population is unlikely.

THREATS

A. The present or threatened destruction, modification, or curtailment of its habitat or range. The rocky cliffs where band-rumped storm-petrels nest on Kauai are too steep for development, and there is no development in the higher elevation lava fields on Mauna Loa, Hawaii, where storm-petrel colonies are believed to occur. Feral goats forage along some cliffs where nests occur on Kauai and may trample nests and increase erosion. Feral rabbits (*Oryctolagus cuniculus*) occur on Lehua Islet and may decrease vegetative cover and increase erosion of nesting sites.

B. Overutilization for commercial, recreational, scientific, or educational purposes. Overutilization is not a threat to the band-rumped storm-petrel. Currently, the species is not known to be taken or used for commercial, recreational, scientific, or educational purposes.

C. Disease or predation. Introduced predators are the most serious threat facing the band-rumped storm-petrel. The Polynesian rat (*Rattus exulans*) was introduced to the Hawaiian Islands by Polynesians prior to the arrival of Europeans, and a number of additional predators have been introduced since the

arrival of Europeans, including the domestic cat (Felis catus), small Indian mongoose (Herpestes auropunctatus), common barn owl (Tyto alba), black rat (R. rattus) and Norway rat (R. norvegicus). These predators are found throughout the main Hawaiian Islands, with the exception of the mongoose, which is not established on Kauai but may have an incipient population there.

The effect of these predators on the band-rumped storm-petrel is likely devastating. Evidence from the islands of Hawaii and Maui show that the Hawaiian dark-rumped petrel, which nests in some of the same areas as the band-rumped storm-petrel, suffers huge losses to introduced predators (Service, unpubl. data; Hodges and Nagata 2001; Hu et al. 2001). During surveys on Mauna Loa, Hawaii in 1992, several caches of Hawaiian dark-rumped petrel carcasses with signs of feral cat predation were found in the same areas where band-rumped storm-petrel vocalizations were heard (Service, unpubl. data). Population modeling of the Hawaiian dark-rumped petrel indicates that predation levels as low as 10 percent in a single season would require a recovery period of at least seven years (Natividad-Hodges 1994). The effects of introduced predators on the breeding success of Hawaiian dark-rumped petrels are probably similar to the effects on band-rumped storm-petrel breeding success because these birds are equally vulnerable and nest in the same areas. Rat bones were collected from a band-rumped storm-petrel nest on a sheer cliff on Kauai (K. Wood, unpubl. data), demonstrating that even remote, inaccessible sites may not be safe from predators.

Predation by introduced species has played a significant role in reducing storm-petrel numbers and in exterminating colonies in the Pacific and other locations worldwide (Moors and Atkinson 1984; Flint 1999). In New Zealand, petrel species are common on islands free of Polynesian rats, but are rare or absent on neighboring islands inhabited by this predator (Robertson and Bell 1984). Small ground nesting and burrow nesting seabirds such as storm-petrels, as well as their eggs and young in such nests, are highly susceptible to predation by rats and other mammalian predators larger than mice (Flint 1999). The band-rumped storm-petrel is relatively small in size, lacks effective anti-predator behavior, and has a lengthy incubation and fledgling period, making the species highly vulnerable to predation by introduced mammals.

There have been no studies conducted on the impact of disease in band-rumped storm-petrels, and the significance of disease as a factor limiting the population is presently unknown. However, avian diseases, particularly avian malaria (Plasmodium relictum capistranoae) and avian pox (Poxvirus avium), both of which are transmitted by the southern house mosquito (Culex quinquefasciatus), have had a devastating effect on endemic Hawaiian forest birds, many of which have little resistance to introduced diseases (van Riper et al. 1986; Atkinson et al. 1995). Avian pox causes lesions on the feet, legs, and bills, and is transmitted by physical contact with an infected bird or through bites by mosquitoes carrying the disease.

D. The inadequacy of existing regulatory mechanisms.

The band-rumped storm-petrel is currently protected under Federal law by the Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703-712). The MBTA regulates most aspects of take, possession, transport, sale, purchase, barter, export, and import of migratory birds including the band-rumped storm-petrel. These regulations prohibit the killing, capturing, and collecting of

individuals, eggs, and nests unless such action is authorized by permit. While the MBTA does prohibit actions that directly kill a covered species, unlike the Endangered Species Act, it does not prohibit habitat modification that indirectly kills or injures a covered species. Therefore, the MBTA affords no habitat protection when the birds are not present.

The Hawaiian population of the band-rumped storm-petrel is listed by the State of Hawaii as an endangered species under Hawaii State Endangered Species Act (Hawaii ESA) (Hawaii Revised Statutes (HRS), Sect. 195D-4(a)). The Hawaii ESA prohibits take, possession, sale, transport, or export of adults, eggs, or young, except as authorized by law, license, or permit. Like the MBTA, the Hawaii ESA affords no protection of habitat.

Although these regulations offer significant protection if storm-petrels were taken for commercial, recreational, or other reasons, they contribute minimally to the active management and recovery of a species. The chance of implementing conservation measures that would lead to recovery of the species would be improved if the band-rumped storm-petrel were federally listed as endangered. As a species covered under the Act, the band-rumped storm-petrel would benefit from an approved recovery plan that would guide recovery efforts, identify responsible agencies, and support agencies in obtaining funding for needed recovery actions. Further, the State may enter into agreements with Federal agencies to administer and manage any area required for the conservation, management, enhancement, or protection of endangered species (HRS, Sect. 195D-5(c)). Funds for these activities could be made available under section 6 of the Federal Endangered Species Act (via State Cooperative Agreements). Listing of this species would therefore reinforce and supplement the protection available under State law. Since many of the band-rumped storm-petrels may nest on National Park Service lands, the provisions of section 7 of the Act would be applied to any actions authorized, funded, or conducted by the National Park Service that may affect the band-rumped storm-petrel.

E. Other natural or manmade factors affecting its continued existence.

A significant impact to the band-rumped storm-petrel results from the effects of artificial lights on fledgling young and, to a lesser degree, adults. Artificial lighting of roadways, resorts, ballparks, residences, and other development in lower elevation areas both attracts and confuses night-flying storm-petrel fledglings and other seabirds, resulting in “fall-out” (Harrison *et al.* 1990, Reed *et al.* 1985, Telfer *et al.* 1987, Planning Solutions 2003) and collisions with buildings and other objects (Banko *et al.* 1991). Artificial lights modify the night sky through which the fledgling birds must navigate after leaving the nest to reach the open sea. Over a 12-year period from 1978 to 1990, Harrison *et al.* (1990) reported that 15 band-rumped storm-petrels, 13 of which were young, were recovered on Kauai as a result of fall-out. The actual extent of such loss and its overall impact on the population is not known because scavengers prevent the majority of fall-outs from being detected, but any loss in such a small population is significant.

A related threat to Band-rumped Storm-petrels and other seabirds in Hawaii is collisions with communication towers and utility lines (Cooper and Day 1998, Podolsky *et al.* 1998, Planning Solutions 2003). Several seabird species that nest in the Hawaiian Islands, including Newell’s Shearwater, Hawaiian Petrel, and Band-rumped Storm-petrel regularly commute between inland nest sites and the ocean. These birds commute at night when unnatural obstacles such as

communication towers and utility lines are difficult to see. Birds may strike these unseen obstacles, often resulting in injury and death. The remains of a dead band-rumped storm-petrel were found under a power line along the road to the atmospheric observatory on the northern slope of Mauna Loa on September 3, 2001 (D. Hu, unpubl. data 2005). The impact from artificial lighting and collisions with communication towers, utility wires, and other structures is expected to increase as the human population grows and development continues on Kauai and other Hawaiian Islands. The human population of Kauai increased by 14 percent from 1990 to 2000 (U.S. Census).

Unstudied factors that could threaten the band-rumped storm-petrel include commercial fisheries interactions and alteration of the prey base upon which the storm-petrel depends. Commercial fisheries are known to adversely affect certain species of seabirds (Furness and Ainley 1984). Prey items taken by the storm-petrel are small, and there are no commercial fisheries that are known to compete directly for this resource. However, the potential effects of large drift nets, purse seines, long lines, and other fishing methods on this species have not been assessed.

Pollution of the open oceans by plastics and other debris that can be mistaken as food by storm-petrels also may pose a threat to the population (Harrison *et al.* 1990). Although a study by Spear *et al.* (1995) found no evidence of plastic ingestion by band-rumped storm-petrels, the sample size was small and inadequate to conclusively determine whether this species suffers from ingestion of plastics. Many closely related seabirds did suffer ill effects from plastic ingestion. The effects of plastic ingestion include physical damage to the digestive tract and the introduction of toxins.

The small size of the Hawaiian population of band-rumped storm-petrels, perhaps not more than a few hundred birds, could be a threat to this species. Small populations are more susceptible to stochastic, genetic, environmental, and demographic events that can lead to extinction (Soule 1987, Lande 1988).

A single human-caused action such as the establishment of mongoose on Kauai, or a natural environmental disturbance such as a hurricane during the breeding season, could cause reproductive failure and could destroy a significant percentage of the known extant individuals.

CONSERVATION MEASURES PLANNED OR IMPLEMENTED

The County of Kauai has recognized the potential threat caused by artificial lighting to other seabirds inhabiting the island (Reed *et al.* 1985; T. Telfer, pers. comm. 1997). Many resorts have reduced or eliminated problematic lighting, and all public street lights on the island are now shielded to reduce the amount of light that escapes horizontally. A Habitat Conservation Plan is being negotiated with the Kauai Island Utility Cooperative in order to mitigate take of listed seabirds by collisions with utility wires, including Newell's shearwater and Hawaiian petrel. Such actions should also help to reduce impacts to the band-rumped storm-petrel.

SUMMARY OF THREATS (including reasons for addition or removal from candidacy, if appropriate)

Predation by alien animals on nests and adults during the breeding season is the most serious

threat to the Hawaiian population of the band-rumped storm-petrel. These predators include feral cats, barn owls, small Indian mongoose, black rats, Polynesian rats, and Norway rats. Attraction of fledglings to artificial lights and collisions with artificial structures such as communication towers and utility lines are also a threat. Erosion of nest sites caused by the actions of alien ungulates and feral rabbits is a threat in some locations.

For species that are being removed from candidate status:

___ Is the removal based in whole or in part on one or more individual conservation efforts that you determined met the standards in the Policy for Evaluation of Conservation Efforts When Making Listing Decisions (PECE)?

RECOMMENDED CONSERVATION MEASURES

This section is required only for new candidates at this time.

LISTING PRIORITY

THREAT			
Magnitude	Immediacy	Taxonomy	Priority
High	Imminent	Monotypic genus	1
		Species	2
		Subspecies/population	3*
	Non-imminent	Monotypic genus	4
		Species	5
		Subspecies/population	6
Moderate to Low	Imminent	Monotypic genus	7
		Species	8
		Subspecies/population	9
	Non-imminent	Monotypic genus	10
		Species	11
		Subspecies/population	12

Rationale for listing priority number:

Magnitude:

The magnitude of threats is high. The most serious threats to the species are already occurring. Alien predators occur throughout the historical range of the band-rumped storm-petrel, and predation has drastically reduced the distribution and abundance of the species. As a result, it is now found only in small numbers in remote cliffs and lava fields that are not as accessible to predators. Attraction to artificial lights and subsequent mortality has already been documented, and such lights occur over much of the species' current range.

Imminence:

Threats to the band-rumped storm-petrel are imminent, and are already occurring. Alien predators have been present throughout the Hawaiian Islands for decades and are known to be affecting seabirds, including the band-rumped storm-petrel. The threat from artificial lighting and collisions with artificial structures also is affecting the species currently, and may worsen as the human population of Hawaii increases.

Rationale for Change in Listing Priority Number (insert if appropriate)

Yes Have you promptly reviewed all of the information received regarding the species for the purpose of determining whether emergency listing is needed?

Is Emergency Listing Warranted? No. The species does not appear to be appropriate for emergency listing at this time because the immediacy of the threats is not so great as to imperil a significant proportion of the taxon within the timeframe of the routine listing process. If it becomes apparent that the routine listing process is insufficient to prevent significant losses that may result in this species' extinction, then the emergency rule process for this species will be initiated. We will continue to monitor the status of the band-rumped storm-petrel as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures.

DESCRIPTION OF MONITORING

Assessment of the status of the band-rumped storm-petrel is conducted primarily by compiling results of irregular surveys conducted by Federal, State, and private biologists, and anecdotal observations made by private naturalists. There are no regular field surveys conducted for the band-rumped storm-petrel, but as described above, there have been searches for nesting areas on Kauai, Hawaii, Maui, and Lehua Islet. The most recent surveys were conducted on Kauai in 2004 and 2005 by biologists from the National Tropical Botanical Garden and private biologists (Wood *et al.* 2002, unpubl. data), and on Lehua Islet in 2004 and 2005 by Service, State of Hawaii, and University of Hawaii biologists (VanderWerf *et al.* 2004, Service, unpubl. data). Other survey work has been conducted incidentally to surveys for the endangered Hawaiian petrel in Hawaii Volcanoes National Park (D. Hu, unpubl. data).

The latest species assessment was sent to nine species experts for review on August 22, 2005, and to enquire if they had any new information relevant to the species. Comments and information were received from three species experts (Robert L. Pyle, Bishop Museum, Darcy Hu, Hawaii Volcanoes National Park, and Ken Wood, National Tropical Botanical Garden), including suggestions for clarifying information in the assessment form, summaries of previous observations since 1992, and new information on the presence of the species in specific locations in 2004 and 2005. This assessment thus uses the best available scientific and commercial data, and is therefore adequate to update the status of the species. However, to fully address the conservation needs of the species, more information is needed to identify locations where management actions could be best implemented, and field surveys are needed to monitor the adequacy of any management actions implemented. Annual surveys could be conducted in known nesting areas by listening for birds as they return at night, by use of marine radar, or by

surveys at sea to identify concentrations of birds that may form offshore from nesting areas.

COORDINATION WITH STATES

Indicate which State(s) (within the range of the species) provided information or comments on the species or latest species assessment: None.

Indicate which State(s) did not provide any information or comments: Hawaii. The latest assessment form was sent to three biologists from the Hawaii Division of Forestry and Wildlife (DOFAW) on August 22, 2005, and earlier to the DOFAW Administrator in October 2004, with requests for review, comment, corrections, and/or additional information.

LITERATURE CITED

- Allan, R.G. 1962. The Madeiran storm-petrel Oceanodroma castro. Ibis 103b:274-295.
- Atkinson, C.T., Woods, K.L., Dusek, R.J., Sileo, L., and Iko, W.M. 1995. Wildlife disease and conservation in Hawaii: Pathogenicity of avian malaria (Plasmodium relictum) in experimentally infected iiwi (Vestiaria coccinea). Parasitology 111:S59-S69.
- Austin, O.L., Jr. 1952. Notes on some petrels of the North Pacific. Bulletin of the Harvard Museum of Comparative Zoology. 107:391-407.
- Banko, W.O., P.C. Banko, and R.E. David. 1991. Specimens and probable breeding activity of the band-rumped storm-petrel on Hawaii. Wilson Bulletin 103:650-655.
- Berger, A.J. 1972. Hawaiian birdlife. Univ. Press Hawaii, Honolulu. 270 pp.
- Browne, R.A., D.J. Anderson, J.N. Houser, F. Cruz, K.L. Glasgow, C. Natividad-Hodges, and G. Massey. 1997. Genetic diversity and divergence of endangered Galapagos and Hawaiian petrel populations. Condor 99:812-815.
- Cooper, B.A., R.E. David, and R.J. Blaha. 1996. Radar and visual surveys of endangered seabirds and bats in the Pohakuloa Training Area, Hawaii, during summer 1995. Final unpublished report for R.M.S. Twill Corporation. 47 pp.
- Cooper, B.A. and R.H. Day. 1998. Summer behavior of dark-rumped petrels and Newell's shearwaters at power lines on Kauai. Colonial Waterbirds 21: 11-19.
- Coulter, M.C. 1984. Seabird conservation in the Galapagos Islands, Ecuador. Pp. 237-244 in J.P. Croxall, P.G.H. Evans, and R.W. Schreiber (eds.), Status and conservation of the world's seabirds, Int. Coun. Bird Preserv. Tech. Bull. No. 2, Cambridge, U.K.
- Cramp, S., and K.E.L. Simmons. 1977. Handbook of the birds of Europe, the Middle East, and North Africa: the birds of the Western Palearctic. Vol. 1: Ostrich-ducks. Oxford University Press. 722 pp.

- Crossin, R.S. 1974. The storm-petrels (Hydrobatidae). Pp. 154-205 in W.B. King (ed.), Pelagic studies of seabirds in the Central and Eastern Pacific Ocean. Smithsonian Institution, Washington, D.C.
- Dole, S.B. 1869. A synopsis of birds hitherto described from the Hawaiian Islands. Proceedings of the Boston Society of Natural History. 12:294-309.
- Dole, S.B. 1879. List of birds of the Hawaiian Islands. Pp. 41-58 in Thomas G. Thrum, Hawaiian Almanac and Annual (5th ed.).
- Flint, E. 1999. Status of seabird populations and conservation in the tropical island Pacific. In L.P. Eldredge, P. Holtus, and J. Maragos (eds.), Marine and coastal biodiversity in the tropical island Pacific region: population, development, and conservation priorities, vol. 2. East-West Center, Honolulu, Hawaii. 32 pp. + Appendices.
- Furness, R.W. and D.G. Ainley. 1984. Threats to seabird populations presented by commercial fisheries. Pp. 701-708 in J.P. Croxall, P.G.H. Evans, and R.W. Schreiber (eds.), Status and conservation of the world's seabirds, Int. Coun. Bird Preserv. Tech. Bull. No. 2, Cambridge, U.K.
- Harris, M.P. 1969. The biology of storm-petrels in the Galapagos. Proceedings of the California Academy of Sciences (4th Series) 37:95-165.
- Harrison, C.S., M.B. Naughton, and S.I. Fefer. 1984. The status and conservation of seabirds in the Hawaiian Archipelago and Johnston Atoll. Pp. 513-26 in J.P. Croxall, P.G.H. Evans, and R.W. Schreiber (eds.), Status and conservation of the world's seabirds, International Council for Bird Preservation Tech. Bull. No. 2, Cambridge, U.K.
- Harrison, C.S., T.C. Telfer, and J.L. Sincock. 1990. The status of Harcourt's storm-petrel (Oceanodroma castro) in Hawaii. Elepaio 50:47-51.
- Harrison, P. 1983. Seabirds, an identification guide. Croom Helm Ltd., Beckenham, Kent, U.K. 448 pp.
- Hasegawa, H. 1984. Status and conservation of seabirds in Japan, with special attention to the short-tailed albatross. Pp. 487-500 in J.P. Croxall, P.G.H. Evans, and R.W. Schreiber (eds.), Status and conservation of the world's seabirds, International Council for Bird Preservation Tech. Bull. No. 2, Cambridge, U.K.
- Henshaw, H.W. 1902. Birds of the Hawaiian Islands. Thomas G. Thrum, Honolulu. 146pp.
- Hodges, C.S. and R.J. Nagata. 2001. Effects of predator control on the survival and breeding success of the endangered Hawaiian Dark-rumped Petrel. Studies in Avian Biology 22:308-318.

- Hu, D., C. Glidden, J.S. Lippert, L. Schnell, J.S. MacIvor, and J. Meisler. 2001. Habitat use and limiting factors in a population of Hawaiian Dark-rumped Petrels on Mauna Loa, Hawaii. *Studies in Avian Biology* 22:234-242.
- King, W.B. 1967. Preliminary Smithsonian identification manual, seabirds of the tropical Pacific Ocean. Smithsonian Institution, Washington, D.C. 126 pp.
- Lande, R. 1988. Genetics and demography in biological conservation. *Science* 241:1455-1460.
- Moors, P.J. and I.A.E. Atkinson. 1984. Predation on seabirds by introduced animals, and factors affecting its severity. Pp. 667-690 in J.P. Croxall, P.G.H. Evans, and R.W. Schreiber (eds.), Status and conservation of the world's seabirds, Int. Coun. Bird Preserv. Tech. Bull. No. 2, Cambridge, U.K.
- Natividad-Hodges, C.S. 1994. Effects of introduced predators on the survival and fledging success of the endangered Hawaiian Dark-rumped Petrel (Pterodroma phaeopygia sandwichensis). Unpublished thesis. University of Washington, Seattle, Washington.
- Olson, S.L. 1992. Biological database and reconnaissance survey of Kahoolawe Island including rare plants, animals, and natural communities. Prepared for Kahoolawe Island Conveyance Commission, Maui, Hawaii by the Hawaii Heritage Program, The Nature Conservancy of Hawaii, Honolulu.
- Olson, S.L., and H.F. James. 1982. Prodrum of the fossil avifauna of the Hawaiian islands. *Smithsonian Contributions to Zoology*. No. 365.
- Pitman, R.L. 1986. Atlas of seabird distribution and relative abundance in the eastern tropical Pacific. Nat. Marine Fish. Serv. Southw. Fish. Center, Admin. Rep. LJ-86-02C. 61 pp.
- Planning Solutions. 2003. Data reduction and summary statistics: Save Our Shearwaters (SOS) bird collection database (1979-2002). Habitat Conservation Plan, Kauai Island Utility Cooperative, HCP Working Paper No. 1. Unpublished report prepared for Kauai Island Utility Cooperative, March 2003; Honolulu, HI.
- Podolsky, R., D.G. Ainley, G. Spencer, L. de Forest, and N. Nur. 1998. Mortality of Newell's Shearwaters caused by collisions with urban structures on Kauai. *Colonial Waterbirds* 21:20-34.
- Pyle, R.L. 1984. Hawaiian Islands region. *American Birds* 38(2):249.
- Pyle, R.L. and J. Engbring. 1985. Checklist of the birds of Micronesia. *Elepaio* 46(6):57-68.
- Reed, J.R., J.L. Sincock, and J.P. Hailman. 1985. Light attraction in endangered Procellariiform birds: reduction by shielding upwards radiation. *Auk* 102:377-383.

- Reynolds, M.H., B.A. Cooper, and R.H. Day. 1997a. Radar study of seabirds and bats on windward Hawaii. *Pacific Science* 51(1):97-106.
- Richardson, R. 1957. The breeding cycles of Hawaiian seabirds. *Bernice P. Bishop Museum Bulletin* No. 218. 41 pp.
- Ridgeway, R. 1882. Description of a new fly-catcher and a supposed new petrel from the Sandwich Islands. *Proceedings of the U.S. National Museum* 4:337-338.
- Robertson, C.J.R. and B.D. Bell. 1984. Seabird status and conservation in the New Zealand region. Pp. 667-690 *in* J.P. Croxall, P.G.H. Evans, and R.W. Schreiber (eds.), *Status and conservation of the world's seabirds*, International Council for Bird Preservation Tech. Bull. No. 2, Cambridge, U.K.
- Slotterback, J.W. 2002. Band-rumped storm-petrel (*Oceanodroma castro*) and Tristram's storm-petrel (*Oceanodroma tristrami*). *In* *The Birds of North America*, No. 673 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.
- Soule, M.E. 1987. *Viable populations for conservation*. Cambridge University Press, London, U.K.
- Spear, L.R., C.A. Ribic, and D.G. Ainley. 1994. Population size and the behavioral and physical factors affecting distribution of storm-petrels (family: Hydrobatidae) in the eastern and central tropical Pacific. Unpublished report. 65 pp.
- Spear, L.R., D.G. Ainley, and C.A. Ribic. 1995. Incidence of plastic in seabirds from the tropical Pacific, 1984-91: relation with distribution of species, sex, age, season, year, and body weight. *Marine Environmental Research* 40(2):123-146.
- Stejneger, L. 1888. Birds of Kauai Island, Hawaiian Archipelago, collected by Mr. Valdemar Knudsen, with descriptions of new species. *Proceedings of the U.S. National Museum* 10:75-102.
- Telfer, T.C., J.L. Sincock, and G.V. Byrd. 1987. Attraction of Hawaiian seabirds to lights: Conservation efforts and effects of moon phase. *Wildlife Society Bulletin* 15:406-413.
- U.S. Fish and Wildlife Service (USFWS). 2004. Lehua Island ecosystem restoration project; joint Federal and state of Hawaii environmental document. *Federal Register* 69:27952-27953.
- VanderWerf, E.A., K.R. Wood, C. Swenson, M. LeGrande, H. Eijzenga, and R.L. Walker. 2004. Biological Inventory and Assessment of Lehua Islet, Hawaii. Final Report, Part 2: Avifauna. Prepared for the U.S. Fish and Wildlife Service Pacific Islands Fish and Wildlife Office, Honolulu, HI. USFWS Research Grant No: 122001J014.

Wood, K.R., D. Boynton, E. VanderWerf, L. Arnold, M. LeGrande, J.W. Slotterback, and D. Kuhn. 2002. The Distribution and Abundance of the Band-rumped Storm-Petrel (Oceanodroma castro): A Preliminary Survey on Kauai, Hawaii. Final report prepared for the U.S. Fish and Wildlife Service Pacific Islands Fish and Wildlife Office, Honolulu, HI.

APPROVAL/CONCURRENCE: Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes, including elevations or removals from candidate status and listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all resubmitted 12-month petition findings, additions or removal of species from candidate status, and listing priority changes.

Approve: **Acting** David Wesley 11/10/05
Regional Director, Fish and Wildlife Service Date

Marilet A. Zablan

Concur: _____ August 23, 2006
Director, Fish and Wildlife Service Date

Do not concur: _____
Director, Fish and Wildlife Service Date

Date of annual review: 09/29/2005

Conducted by: Dr. Eric A. VanderWerf, Hawaiian Birds Recovery Coordinator (Pacific Islands Fish and Wildlife Office review by: Marilet A. Zablan, Vertebrate Conservation Program Leader; Gina M. Shultz, Assistant Field Supervisor for Endangered Species; and Patrick Leonard, Field Supervisor)

(Revised 8/12/05)